and contained in Roman thought and writing. That measure is, of course, a large one. The Alexandrines in particular, only partly Greek, and living and learning in cities and university towns, amid libraries and observatories, first developed the modern love alike of nature and of natural science. From them it passed to Rome. Aratus, the poet and fellow-countryman whom St. Paul quoted at Athens, was one of the most popular poets at Rome, and influenced, as the President of the Royal Society points out, Cicero and Virgil; he might have added, through Cicero, Lucretius also. Both Lucretius and Virgil, however, owed more still to the prevailing Epicureanism, which from the Greek schools of their time passed over to and permeated Italy. Catullus and Horace and Ovid fell under the same Greek influences.

But this is not the true, genuine native Roman love of nature. That love, a more superficial yet in some ways more natural and pleasing thing, is, as these pages show, to be found in almost all the poets from Catullus to Statius and Martial, in the prose-writers from Varro to Seneca. Its varied expressions and manifestations constitute a rich and copious subject, but Sir Archibald deals with this very skilfully by arranging it under different headings: the love of flowers; the love of animals; Roman gardens; flowers and foliage in Roman art; day and night; the seasons; springs, rivers, and lakes; mountains; the sea-shores; and so on. The result is that he is never tedious. The reader can take up any chapter and almost any page separately, and find something to interest him—the character of the melancholy, amorous Propertius, asking to be "put among the girls"; the clever, frivolous, querulous Ovid; the intense, direct Catullus; the pretentious and somewhat hypocritical Seneca; the importance and the character, almost personal in its significance, of winds and stars to the ancient farmer and seaman; the testimony of the Pompeiian wall-frescoes, half foreign, half local and native, their figures Greek, their landscapes Latin—each is touched in succession with a fresh eye and firm hand.

Incidentally, also, as might be expected, there are references to modern writers—not only to Tennyson, already alluded to, but to Spenser and Shakespeare, to Cowley and Cowper, to Coleridge and Keats, and, of course, to Wordsworth. Perhaps one of the most striking points which is made in these pages, is that the ancients too possessed that

> "inner eye
> Which is the bliss of solitude."

Indeed, the Romans had the very expression, for does not Ovid in his "Metamorphoses," as Sir Archibald Geikie points out, write:—

> Quae natura negabat
> Visibus humanis, oculis ea pectoris hausit?

To conclude, the theme is one which has been touched before, notably by Prof. W. R. Hardie in "Lectures on Classical Subjects," published about a dozen years ago, but never has it been handled so thoroughly or with more freshness and suggestiveness than by the President of the Royal Society in this volume, which we confidently commend to scholars and men of science, but still more confidently to the general reader.

T. HERBERT WARREN.

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## PHYSICS—POPULAR AND APPLIED.

(1) *Matter and Energy.* By F. Soddy, F.R.S. Pp. 256. (London: Williams and Norgate; New York: Henry Holt and Co., n.d.) Price 1*s.* net. (Home University Library of Modern Knowledge.)

(2) *Practical Exercises in Physiological Optics.* By Dr. G. J. Burch, F.R.S. Pp. 164. (Oxford: Clarendon Press, 1912.) Price 4*s.* net.

(3) *The Energy System of Matter.* A Deduction from Terrestrial Energy Phenomena. By James Weir. Pp. ix+200. (London: Longmans, Green and Co., 1912.) Price 6*s.* net.

(4) *The Cinematograph and Natural Science.* The Achievements and Possibilities of Cinematography as an Aid to Scientific Research. By L. Donaldson. Pp. 88. (London: Ganes, Ltd., 85, Shaftesbury Avenue, W., 1912.) Price 2*s.* 6*d.* net.

(5) *Oscillations et Vibrations.* Étude générale des Mouvements Vibratoires. By A. Boutaric. Pp. ix+403. (Paris: Octave Doin et Fils, 1912.) Price 5 francs. (Encyclopédie Scientifique.)

(6) *Physik.* Zum Gebrauch bei physikalischen Vorlesungen in höheren Lehranstalten sowie zum Selbstunterricht. By Prof. H. Böttger. Erster Band: "Mechanik, Wärmelehre, Akustik." Pp. xiii+983. ("Das Buch der Natur," Dreiundzwanzigste Auflage. Dritter Teil, Zweite Abt.) (Braunschweig: F. Vieweg und Sohn, 1912.) Price 15 marks.

(1) IT is always difficult for the reviewer of a book who naturally possesses a more or less intimate knowledge of the subject under review to write with confidence concerning a popular treatise. There is always the possibility that his previous knowledge enables him to appreciate many points which may not be so easily grasped by others less acquainted with the sub

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ject. And, after all, it is for this latter class that such books are primarily intended. But in the present case there is scarcely room for doubt that Prof. Soddy has successfully accomplished the very difficult task of making physics of absorbing interest on popular lines. This has been done without any of that sacrifice of exactness of statement which so often mars works of this kind; thus the trained physicist and the novice may read the book with equal pleasure. It is quite surprising how many phenomena the author has been able to deal with in this fashion, and what up-to date work he has been able to introduce. There is no space available to detail the various contents more than to say that such subjects as the kinetic theory of matter (including reference to Perrin's beautiful experiments on Brownian movements) and radioactivity, among others, are treated with admirable lucidity. A book of this kind deserves a longer review; it is to be hoped it will have a large circulation, for it forms a worthy addition to the excellent series to which it belongs.

(2) This consists of a series of descriptions of experiments which Prof. Burch has compiled, based upon the work of practical classes in the Physiological Laboratory, Oxford. About sixty experiments are described, dealing with the dioptrics of the eye, judgments of the eye, sensations of the eye, the measurement of colour sensations, and experiments with flashing light.

(3) From time to time during the progress of physical science a book appears the author of which is thoroughly dissatisfied with everything that has been accomplished, and desires to begin again on an entirely new foundation. This book is the latest of the kind. The author, in this case, claims to have made an intimate study of natural phenomena, and to possess a lengthened experience in physical research. Such a claim is, however, scarcely borne out by a perusal of his book. One cannot help thinking that his dissatisfaction with things in general arises rather from his own lack of acquaintance with the exact nature of physical science than from any fundamental error in present-day theories. It is really impossible to take the book seriously; at any rate, the present writer finds it so.

(4) This is a little book dealing with various applications of the kinematograph to scientific research. The author directs attention to what has already been achieved, and throws out suggestions as to the lines upon which further progress could be made.

(5) This is a treatise of a rather advanced character, though very much compressed, upon wave-motion, &c., particularly in its applications to sound and light. It is rather poorly printed, and the diagrams are not well produced.

(6) Like many similar German text-books of physics, the treatment in this one is very full—surprisingly so when it is remembered that it is intended for use in schools. This is the first volume, and comprises mechanics, heat, and sound. The type and diagrams are good.

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## *MICRO-ORGANISMS AND THE HOMESTEAD.*

(1) *Microbiology for Agricultural and Domestic Science Students.* Edited by Prof. C. E. Marshall. Pp. xxi+724. (London: J. and A. Churchill, 1912.) Price 10*s.* 6*d.* net.

(2) *Microbes and Toxins.* By Dr. E. Burnet. With a preface by Elie Metchnikoff. Translated from the French by Dr. C. Broquet and Dr. W. M. Scott. Pp. xvi+316. (London: William Heinemann, 1912.) Price 5*s.* net.

(3) *Bacteria as Friends and Foes of the Dairy Farmer.* By Wilfrid Sadler. Pp. xv+112. (London: Methuen and Co., Ltd., 1912.) Price 1*s.* 6*d.*

(1) MICRO-ORGANISMS are of far-reaching importance in agriculture, and the domestic science student cannot afford to neglect them, and the appearance of a work dealing with these branches of bacteriology, particularly the latter, is therefore opportune.

A number of well-known authors, specialists for the most part in their various subjects, have collaborated to produce the book under review. The editor, Prof. Marshall, fully recognises the weakness of this system of compilation, and has attempted, with success we think, to coordinate the whole. He points out that the term "bacteriology" has come to include many groups of micro-organisms other than the true bacteria, and the term "microbiology" has therefore been employed as a title for the present book.

The scheme of the book is comprehensive and well conceived, and ranges over a wide field. The subject-matter is divided into three parts: the first deals with the morphology and culture of micro-organisms, including the Protozoa; the second with the physiology of micro-organisms; and the third with applied microbiology. The last includes sections on air, water and sewage, the soil, milk and milk products, the preservation of foods, alcohol, vinegar and other fermentation products, and the microbial diseases of plants, man, and animals. We have found practically nothing in the contents to criticise, and the book is well illustrated with 128 figures in the text and one coloured plate of the malaria parasite.

(2) This book fills a lacuna in bacteriological

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